Lecture # 01
Introduction to ICT(CE-100)

Engr. Muhammad Naveed Khurshid

Overview

- What is ICT?
- History of Computers.
- Categories of Computers.

ICT Stands for?

- I: Information
- C: Communication
- T: Technology

Information

- Information is a processed **data** that conveys meaning and is useful to user.
- Data consists of raw facts and figures. It does not have any meaning until it is processed and turned into something meaningful.

Communication

- Communication is transfer of data, instructions or information among persons/devices through media such as computer, cell phone, radio, internet, television etc.

Technology

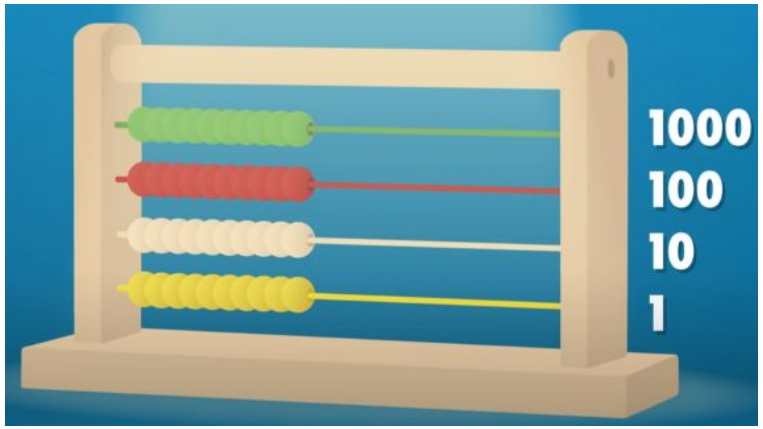
- Technology is use of tools, techniques, systems or machines for solving problems or achieving some kind of goals.
- It is application of Tools and methods used for communicating information to people.

Definition of ICT

- ICT can be explained as using computer knowledge to process data into information and making it available to people.
- ICT is a combination of **Computer Technology** and **Communication Technology.**
- Computer Technology: Tool for storing and Processing Information in Digital form.
- Communication Technology: Helps us to transfer and disseminate digital information.

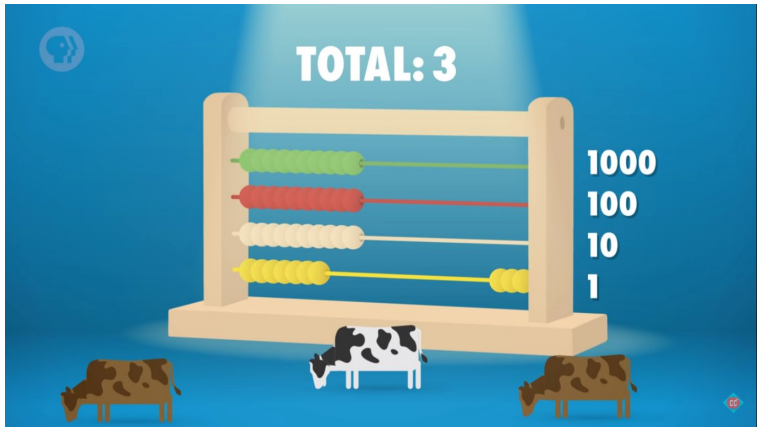
History of Computers

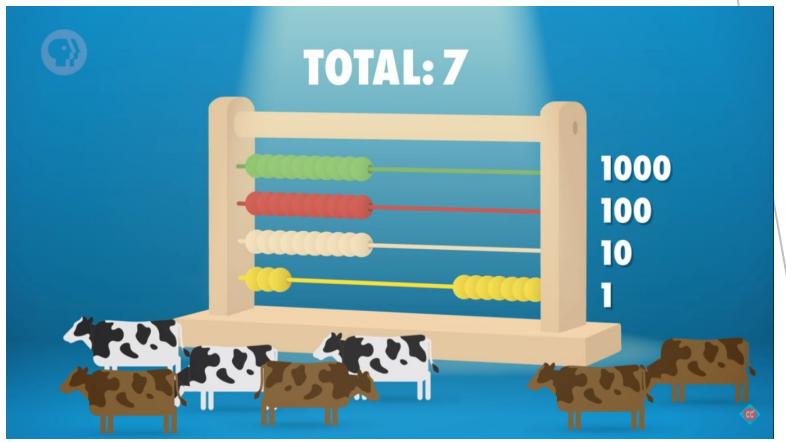
ABACUS

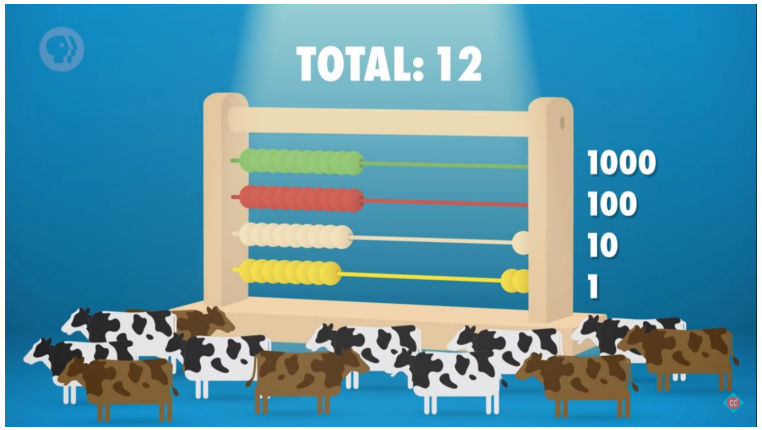


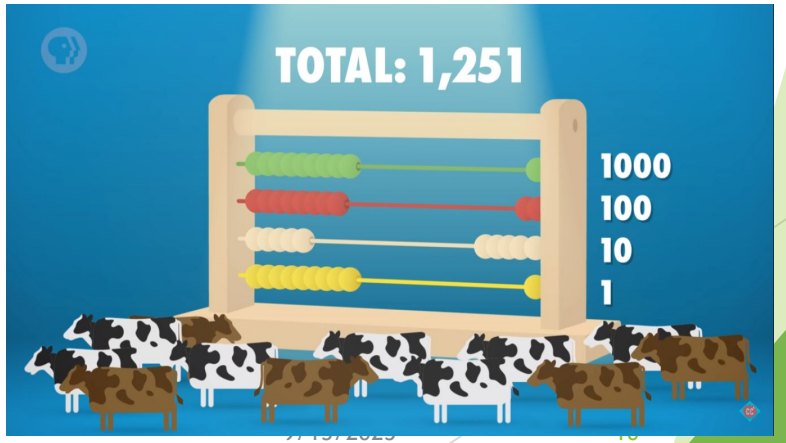
- **3000 BC:** The earliest device recognized for computing was *ABACUS* was invented in Egypt around 2500 BC .
- It's essentially a hand operated calculator that helps add and subtract many numbers. It also stores the current state of your computation.
- There are many variants of Abacus but lets look at a very basic version with each row representing a different power of 10.

ABACUS Cont…


TOTAL: 3
1000
100
10
1


TOTAL: 7
1000
100
10
1


TOTAL: 12
1000
100
10
1


TOTAL: 1,251
1000
100
10
1

History of Computers Cont…

- For the next 4000 years, humans developed many computing devices for many purposes like multiplication, division, latitude of sea, sun rise, position of celestial bodies.
- These devices made many calculations more easier, faster and accurate.
- None of these devices were ever called computers.

History of Computers Cont…

- The earliest documented use of the word computer is from 1613
- Actually, it wasn’t a computer. It was a job title.
- Computer was actually a person who used to do calculations, sometimes, with the help of machines.
- This job title persisted until the late 1800s, when the meaning of computer started shifting to refer to devices.

Pascaline

- 1642: A Frenchman Blaise Pascal introduced the first mechanical calculating device.
- Series of wheels with teeth which could be turned using hands
- Used to handle 999,999.99
- Perform both addition and subtraction.

Pascaline

Centaines de Mille
Dixaines de Mille
Milles
Centaines
Dixaines
Nombres Simples
Sols
Deniers

Stepped Reckoner

- Step Reckoner, a calculating **machine** designed (1671) and built (1673) by the German mathematician-philosopher Gottfried Wilhelm von Leibniz.
- The Step Reckoner expanded on the French mathematician-philosopher Blaise **Pascal**'s ideas and **did** multiplication by repeated addition and shifting.
- Back then it was the first machine that could do all of the four operations i.e, addition, subtraction, division and multiplication.

Pre-Computed Tables

- All these mechanical machines were very time consuming. It could take many hours to solve a complex problem because it involves many steps.
- Also, these machines were costly. So, most people experienced computing through “Pre-Computed Tables”, assembled by human computers.
- Instead of complex and time consuming computations on machines, they were able to find their answer from a book consisting of Pre-Computed Tables.

Difference Engine

- 1833: Charles Babbage
  - Professor of Mathematics
  - Cambridge University
  - With Assistance of Lady Augusta Ada Lovelace
- He started construction of the machine in 1823 and worked on it for almost 2 decades. Then the project was abandoned and completed by some historians in 1991. developed a machine that could store information, calculate numbers and solve algebraic expression.

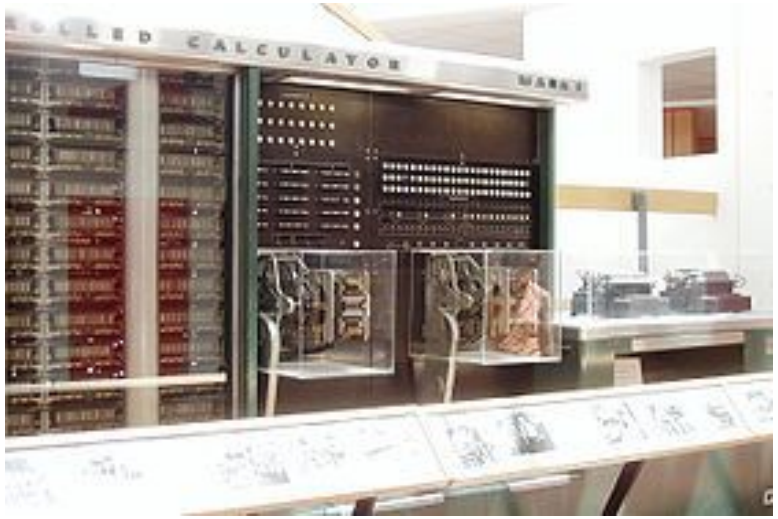
Punched Card

- 1890: Herman Hollerith
  - American Inventor
- developed devices that were able to read information which had been punched into cards automatically
- developed a machine called the census machine
  - US Census Bureau.
  - Capable of reading numbers, characters, and also special symbols.

Harvard Mark I

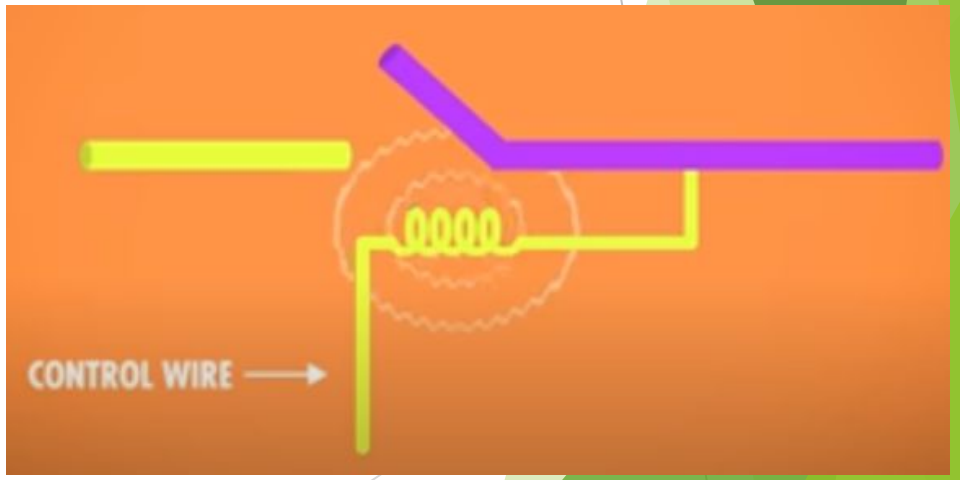
- One of the largest electromechanical computers built was Harvard Mark I.
- Completed in 1944 by IBM.
- It contained 765000 components, 3M connections and 500 miles of wire.
- Capable of reading numbers, characters, and also special symbols

Harvard Mark I



Mechanical Relays

- Relays were used for the control operations. These control circuits were further connected to different machines like motors to perform different tasks like increment the counter.
- Draw back was slow switching speed and wear & tear..
- 3 additions/subtractions per second.
- Multiplication in 6 seconds.
- Divisions took 15 seconds.
- More complex operations took more than 1 minute.



Thermionic Valves

- So, for computing to get advanced, we needed component other than relays.
- Fortunately, that alternative already existed.
- In 1904, John Flemming developed a new electrical component ” Thermionic Valves”.
- It has 2 electrodes inside an air tight glass bulb. This was the first vacuum tube.

Thermionic Valves

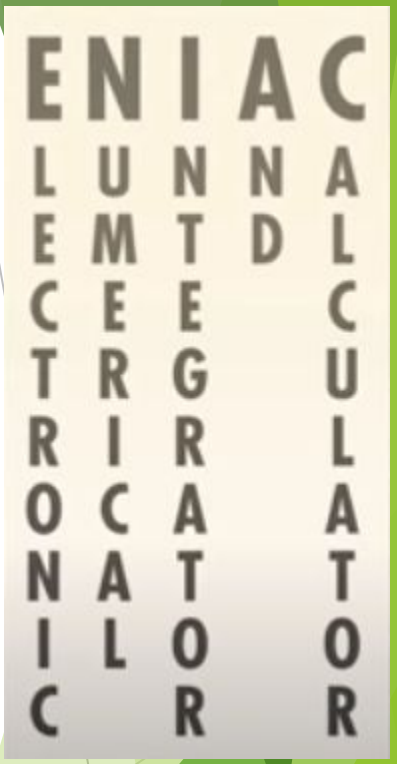
- In these vacuum tubes, one electronic will get heated and emit electrons. The other one, if positively charged, will attract the electrons. Hence resulting in flow of current.
- A component was missing to control the ***switching*** operation.
- In 1906, a 3rd electrode was added to flemming's design for the switching operation.
- If the control electrode has positive charge, it will allow the flow of electrons, otherwise not.
- Switching here is same as relays but much ***faster*** as vacuum tubes have no moving parts.
- They provide a shift from **electromechanical to electronic computing.**

COLOSSUS Mark 1

- 1st large scale use of vacuum tubes was in Colossus Mark 1 designed by Engineer Tommy Flowers.
- Completed in 1943.
- 1600 vacuum tubes.
- It is regarded as 1st programmable electronic computer.
- Programming was done by plugging Hundreds of wires into plug boards.
- It had to be configured to perform any specific computation.

ENIAC

- Completed in 1946.
- It was truly the worlds' **first general purpose** electronic programmable computer.
- Electronic Numerical Integrator And Computer (ENIAC)
- Averages 5,000 operations per seconds.
- Worked for almost 10 years.



Invention of A Transistor

- There were **limitations** of vacuum tubes as they were very **fragile**.
- So, another switching device was needed.
- In 1947, scientists from bell laboratories invented the Transistor and a whole new era of computing was born.

Transistor

- Transistor is like a relay or vacuum tube.
- It works as a close or open switch when power is applied through a control wire.
- Transistors usually have 2 electrodes separated by a material which sometimes conduct electricity and sometimes don't i.e, semi conductor.
- Transistors were made smaller than the smallest possible relays or vacuum tubes which reduced the size of computers like IBM 6OA, released n 1957.
- First fully transistor powered, commercially available computer

Transistor

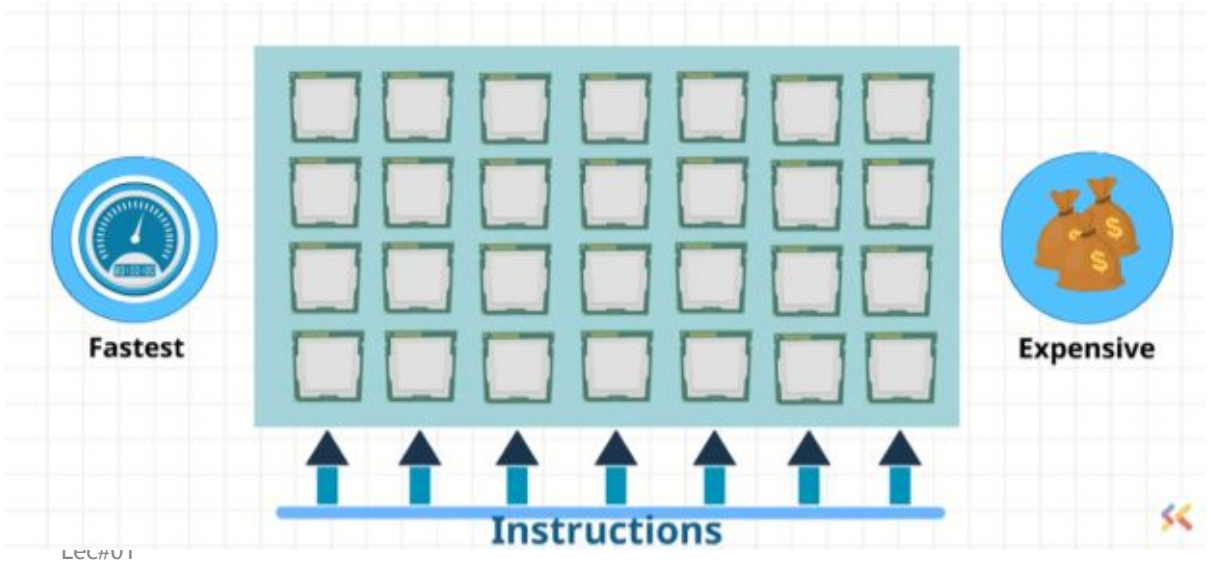
- **After transistors, we finally found our way to the nano technology we have today in our systems.**

Categories of Computer

Types of Computers
Micro Computer
Mini Computer
Mainframe Computer
Super Computer
summit
Size and Speed

Super Computers

- Supercomputers are the largest in size and the most costly computers in the world. Supercomputers are used for large and complex mathematical computations. Supercomputer's speed is more than Mainframe computers so they can execute billions of instructions within a second.



Main Frame Computer

Mainframe Computers are less costly, small in size, and slower in speed than the supercomputers. They are used as a storage for large database and serve as a maximum number of users simultaneously. Mainframe computer's speed is comparatively less than Supercomputers

Mini Computers

- They lie somewhere in between mainframe and micro computers.
- Their storage and processing capacity is greater than micro computers but less than mainframe computers.

Micro Computers

- They are widely used in homes and offices because of their smaller size and cost effectiveness.
- They include:
  - Desktop Computers.
  - Work Stations.
  - Laptops.
  - Embedded computers.
  - Mobile/Tabs.